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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10.002.317 | 10.25.2001 | Thomas K. Wood | 9842-273-999 | 2979 |

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EXAMINER

MARX, IRENE

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1651

DATE MAILED: 07.14.2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/002,317

Examiner

Irene Marx

Applicant(s)

WOOD ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) 1-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

The application should be reviewed for errors. Error occurs, for example, in the recitation of "a aluminum" in claim 25.

The election without traverse filed 5/23/03 is acknowledged. Claims 24-34 are being considered on the merits.

Claims 24-34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 24 is confusing in the recitation "applying on said exterior surface a protective biofilm... wherein said protective film is a bacterium". It is unclear how a biofilm is "applied". Moreover, the definition of the biofilm as consisting of one bacterium appears incorrect, particularly with respect to dependent claim 32, wherein the biofilm (bacterium) is between 10 μm and 20 μm thick.

Claim 27 is vague and indefinite in the recitation of "mild steel 1010". This does not appear to be a term of art, and it is unclear what this terminology is intended to encompass.

Claim 34 is vague and indefinite in the recitation of "Luria-Bertani medium". This does not appear to be a term of art, and it is unclear what this terminology is intended to encompass.

Claims 28-30 are vague and indefinite in that it is unclear whether "a bacterium" of claims 28-30 is the same as the biofilm bacterium or in addition to the biofilm bacterium.

Claim 31 is confusing in that it is unclear whether or not the polyanionic chemical composition applied is the polyanionic chemical composition secreted by the bacterium.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 24-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jayaraman *et al.* (1997) taken with Sekine *et al.* and Hardoyo *et al.*.

The claims are directed to reduction of corrosion by providing a metal and applying on an exterior surface a protective bacterial biofilm that reduces corrosion formed by a bacterium that secretes a polyanionic chemical composition such as polyphosphate.

Jayaraman *et al.* disclose the reduction of corrosion by providing a metal and applying on an exterior surface a protective bacterial biofilm that reduces corrosion formed by a bacterium, such as *E. coli* (See, e.g., page 64, et seq.).

The reference differs from the claimed invention in that the reference is silent regarding the secretion of a polyanionic chemical composition by the biofilm forming bacteria, including genetically engineered bacteria.

However, it is well known in the art that anionic polymers reduce corrosion, as adequately demonstrated by Sekine *et al.* (See, e.g., page 3173, Conclusions). In addition, Hardoyo *et al.* disclose an *E. coli* strain which has been genetically engineered to secrete polyphosphate, a polyanionic chemical composition. One of ordinary skill in the art would reasonably have expected this strain to also produce a protective biofilm.

Accordingly, one of ordinary skill in the art would have had a reasonable expectation of success in using a biofilm forming *E. coli* that secretes polyphosphate in a process of reducing corrosion on a surface of any metal including aluminium, copper, titanium, nickel, alloys thereof and various types of steel. In addition one of ordinary skill in the art would have reasonably expected that a bacterial biofilm would protect the surface of these metals when immersed in liquids such as culture media or artificial seawater. See, e.g., Jayaraman *et al.* Fig 1a, b, page 64, wherein biofilms on steel are tested in Luria-Bertani medium.

In addition, the adjustment of the thickness of the biofilm by optimization of conditions such as culture media and length of growth of the bacteria, identified as result-effective variables cited in the references would have been prima facie obvious to a person having ordinary skill in the art.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the process of reduction of corrosion disclosed by Jayaraman *et al.* by substituting a bacterium that secretes a polyanionic chemical composition

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such as polyphosphate, as suggested by the teachings of Sekine *et al.* and Hardoyo *et al.* for the expected economic benefits of minimizing losses due to metal corrosion by optimizing the protective properties of bacterial biofilms on metals vulnerable to corrosion by addition of polyanionic polymers.

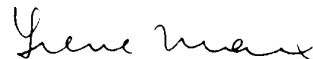
Thus, the claimed invention as a whole was clearly *prima facie* obvious, especially in the absence of evidence to the contrary.

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Irene Marx whose telephone number is (703) 308-2922. The examiner can normally be reached on Monday through Friday from 6:30 AM to 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn, can be reached on (703) 308-4743. The appropriate fax phone number for the organization where this application or proceeding is assigned is before final (703) 872-9306 and after final, (703) 872-9307.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Customer Service whose telephone number is (703) 308-0198 or the receptionist whose telephone number is (703) 308-1235.



Irene Marx
Primary Examiner
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